PROC. ENTOMOL. SOC. WASH.
101(2), 1999, pp. 347–358

A REVIEW OF THE BEACH-FLY GENUS *ISOCANACE* MATHIS (DIPTERA: CANACIDAE)

WAYNE N. MATHIS

Department of Entomology, Smithsonian Institution, Washington, DC 20560-0169, U.S.A. (e-mail: mathisw@nmnh.si.edu)

Abstract.—The species of the beach-fly genus *Isocanace* Mathis are reviewed, including the description of two new species: ***I. crosbyi*** (New Zealand. South Island. NN: Cable Bay (41°09.6′S, 173°24.9′E) and ***I. freidbergi*** (Kenya. Takaungu (50 km N of Mombasa)). Descriptions for the genus and two species groups are also revised.

Key Words: review, Diptera, Canacidae, beach flies, *Isocanace, I. crosbyi, I. freidbergi,* Old World

Recent field work on New Zealand has led to the discovery of the first species of the beach-fly family Canacidae from that country and has also prompted the research that resulted in this review of the genus *Isocanace* Mathis. *Macrocanace* Tonnoir and Malloch, with two endemic species from New Zealand, had previously been included in the Canacidae (Harrison 1959), but is now assigned to the family Tethinidae (Mathis and Munari 1996).

The New Zealand species of Canacidae is undescribed and is in the genus *Isocanace* where it is the second known species of the *Isocanace albiceps* group. The first species of that group, *I. albiceps* (Malloch), is from Australia (Mathis 1996). The new species is apparently widespread on New Zealand, occurring on both North and South Islands and undoubtedly on some of the associated offshore islands.

I am also taking this opportunity to describe an Afrotropical species of *Isocanace* that Amnon Freidberg and Fini Kaplan collected some years ago in Kenya. The latter species belongs to the *Isocanace briani* group, which previously comprised three Afrotropical species: *I. australis* Mathis (Kenya, South Africa), *I. briani* Mathis (Aldabra, Madagascar), and *I. flava* (Canzoneri and Meneghini; Zaire). The last species, *I. flava,* is unusual among beach flies, being one of just a few canacid species that occurs in freshwater habitats. As implied by the common name for the family, most species occur in saline habitats, especially along maritime coasts. The new species from Kenya is very similar to and is apparently the sister species of *I. flava,* although it is found in saline environments along the western coast of the Indian Ocean.

The addition of two new species to *Isocanace,* one to each of the species groups, alters the generic and species-group characterizations, which are revised. A revised key to the species groups and species is also provided.

Isocanace is a relatively recent genus in the nomenclatural history of the Canacidae (Mathis 1982), and the genus has been treated in only two subsequent papers (Mathis 1992, 1996). The first paper is a world catalog, and the second is a review of the Australian beach flies. *Isocanace* is known only from the Afrotropical and Australasian Regions of the Old World (Mathis

1992). This apparently disjunct distribution is probably an artifact due to the poor sampling of Canacidae from countries between Australia and Africa rather than the actual distribution of the genus. Nothing is known about the immature stages or most other aspects about the biology of the included species except for brief comments on habitats where specimens have been collected.

The descriptive format for the new species follows Mathis and Wirth (1979) and Mathis (1982, 1988). More details concerning the morphology and higher classification of the Canacidae are found in Mathis (1982, 1992) and Wirth (1987). I follow Crosby et al.'s (1976) geographic codes for New Zealand zoogeographic provinces: AK = Auckland, NC = North Canterbury, NN = Nelson.

Two venational ratios are used in the descriptions. Costal vein ratio: The straight line distance between the apices of vein R_{2+3} and R_{4+5}/distance between the apices of veins R_1 and R_{2+3}. M vein ratio: The straight line distance along vein M between crossveins (r-m and dm-cu)/distance apicad of dm-cu.

Specimens are housed in the following institutions (acronyms are used in the descriptive portion of this paper).

AM Australian Museum, Sydney, Australia

ANIC The Australian National Insect Collection, Division of Entomology, CSIRO, Canberra, Australia

MNHN Muséum National d'Histoire Naturelle, Paris, France

MRAC Musée Royal de l'Afrique Centrale (Koninklijk Museum voor Midden-Afrika), Tervuren, Belgium

NMP Natal Museum, Pietermaritzburg, South Africa

NZAC New Zealand Arthropod Collection, Entomology Division, Landcare Research, Auckland, New Zealand

TAU Tel Aviv University, Tel Aviv, Israel

UQIC University of Queensland Insect Collection, Brisbane, Australia

USNM former United States National Museum, collections in the National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA

Genus *Isocanace* Mathis

Isocanace Mathis 1982: 11. Type species: *Isocanace briani* Mathis, by original designation.—Mathis 1992: 5–6 [world catalog]; 1996: 337–339 [Australian fauna].

Canace, in part, of authors: Mathis and Wirth 1979: 786.

Diagnosis.—Resembling *Chaetocanace* Hendel but differing from it and other genera by the following combination of characters.

Head: Mesofrons distinct from parafrons, shinier, less microtomentose, with 2–3 large, lateral, generally proclinate setae; postocellar seta smaller than ocellar seta and with more proclinate orientation; 3–4 pairs of large, lateroclinate, fronto-orbital setae; arista plumose, length of branched rays varying from approximately subequal to nearly twice basal aristal width; dorsally genal setae 2–3; dorsally curved genal seta 1.

Thorax: Dorsocentral setae 4 (1+3); acrostichal setae evident, in 2 rows, but large, prescutellar pair lacking; 2 pairs of scutellar setae and frequently some smaller setae inserted dorsally; with only 1 supra-alar seta; 1–2 notopleural setae, if only 1, anterior seta lacking; color of pleural setae variable, pale yellow to black; postpronotum bare of setulae; katepisternal seta present or absent; 1 large anepisternal seta; hindtibia lacking apical seta anteroventrally; apical section of vein M straight.

Abdomen: Female genital lamellae very broad basally, basilateral margins rounded, narrowed rather abruptly at level of cleft, lamellae very narrow from level of cleft to apices, with only 1 large, stout, acute terminal seta at each apex. Male surstylus

quite variable, generally slender and with apical curvature.

Distribution.—Old World. Afrotropical (Aldabra, Kenya, Madagascar, South Africa, and Zaire), Australian (New South Wales), New Zealand.

Discussion.—Mathis and Wirth (1979) first noted the possible relationship of some species subsequently placed in *Isocanace* in the remarks section of *Canace stuckenbergi* (=*I. briani*). Mathis (1982) concluded that this group of species is a monophyletic lineage that is more closely related to *Chaetocanace* than to *Canace* Haliday, sensu stricto, and named it as the genus *Isocanace*. Study of the type series of *Canace flava* Canzoneri and Meneghini revealed that this species too is closely related to *I. briani*, thus making a total of four described species. The addition of two new species brings the number of described species to six.

Key to Species Groups and Species of *Isocanace*

1. Katepisternal seta lacking; mesofrons bare in middle; anterior notopleural seta subequal to posterior seta; 2 dorsally genal setae (Australasian, the *Isocanace albiceps* group) 2
– Katepisternal seta present, although sometimes pale; mesofrons with scattered setulae on middle; anterior notopleural seta distinctly smaller than posterior seta or lacking; 3 dorsally genal setae (Afrotropical, the *Isocanace briani* group) 3
2. Specimens generally more tan to brown, especially frons, and somewhat on mesonotum and dorsum of abdomen; acrostichal setulae sparse and in 2 rows; scutellum conspicuously wider than long; surstylus narrow, apex with recurved knob (Australia) . . . *I. albiceps* (Malloch)
– Specimens generally gray, frons appearing bluish to blackish gray, mesonotum and dorsum of abdomen whitish gray to gray, at most partially tannish medially; acrostichal setulae comparatively numerous and in 4 rows, lateral row with fewer setulae; scutellum almost as long as wide; surstylus broad, apex not recurved or knoblike (New Zealand) . . . . . *I. crosbyi*, new species
3. Arista with branching rays long, some nearly double aristal width at base; anepisternal and usually katepisternal seta pale, mostly yellowish (Madagascar and Aldabra Islands) . . . . . *I. briani* Mathis
– Arista with branching rays shorter, at most slightly longer than aristal width at base; anepisternal and katepisternal seta black 4
4. Anterior notopleural seta present, although weaker than posterior seta; surstylus in lateral view narrow, with subapical posterior swelling bearing several pale setae, apical ⅓ curved posteriorly (Kenya, South Africa) . . . . . *I. australis* Mathis
– Anterior notopleural seta lacking or very weak and pale; surstylus wider in lateral view, with subapical anterior swelling, apical ⅓ narrowed considerably and curved anteriorly 5
5. Lateroclinate fronto-orbital setae 4. Compressed sickle-shaped portion of surstylus narrow (Fig. 29) (Zaire) . . . . . *I. flava* (Canzoneri and Meneghini)
– Lateroclinate fronto-orbital setae 3. Compressed sickle-shaped portion of surstylus broad (Fig. 30) (Kenya) . . . . . *I. freidbergi*, new species

Isocanace albiceps Group

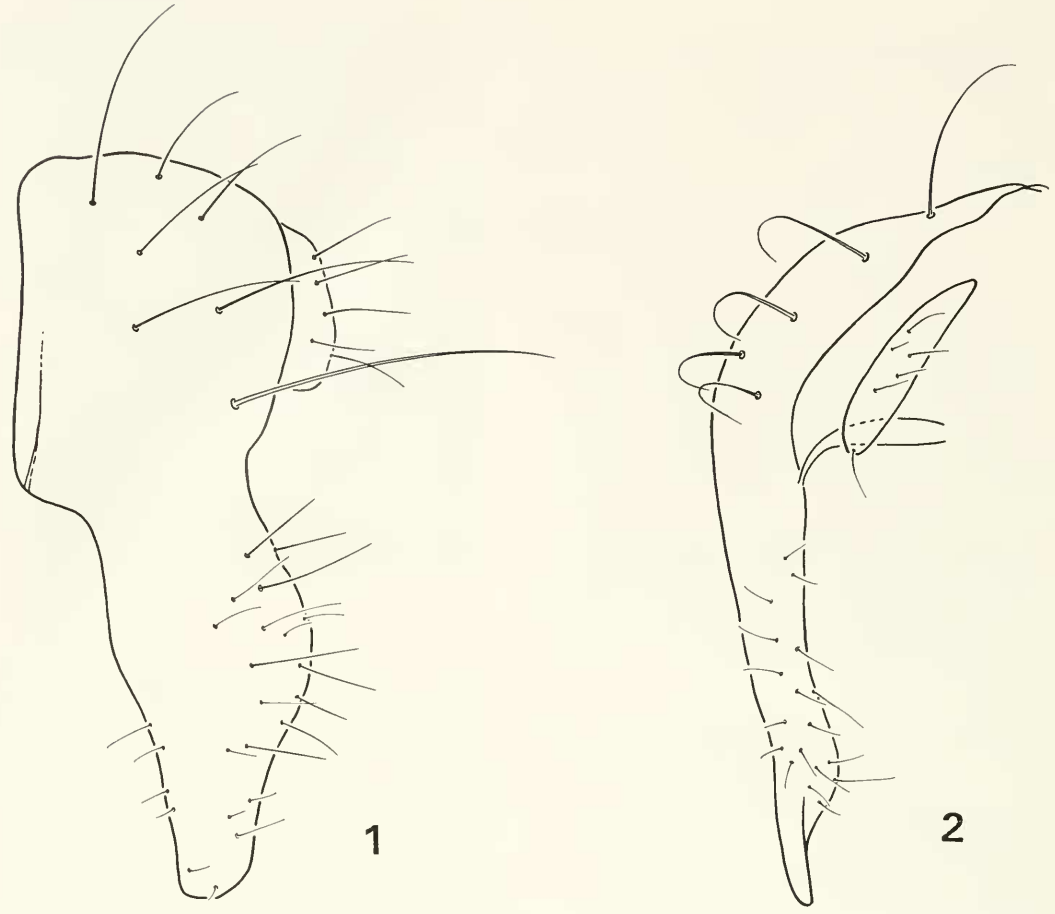
Diagnosis.—Differing from the *Isocanace briani* group as follows: *Head:* mesofrons bare in middle; lateroclinate fronto-orbital setae 4; dorsally genal setae 2. *Thorax:* anterior notopleural seta subequal to posterior seta; katepisternal seta lacking; femora concolorous, usually gray to brownish gray.

Distribution.—Australasian: Australia, New Zealand.

Isocanace crosbyi Mathis, new species
(Figs. 1–2)

Description.—This species is similar to *I. albiceps* but is distinguished from it and other congeners by the following combination of characters: small to moderately-small beach flies, length 1.55–2.15 mm.

Head: Mesofrons whitish gray to bluish gray, subshiny, lacking setulae in middle; lateroclinate fronto-orbital setae 4. Antenna black with sparse, whitish gray microtomentum; arista bearing short branching hairs, these not much longer than basal aristal width. Gena with 2 large dorsally setae and only 2 setulae anterior of ventral dor-



Figs. 1–2. External male terminalia of *Isocanace crosbyi*. 1, Epandrium, cercus, and surstylus, lateral view. 2, Surstylus, posterior view.

sally seta, rarely with a posterior setula. Maxillary palpus yellow.

Thorax: Mesonotum brownish gray to bluish gray to gray, varying from somewhat contrasted to concolorous with grayish pleural region; acrostichal setulae in 4 rows, lateral row somewhat irregular and with fewer setulae; anterior notopleural seta well developed, subequal in size and color to posterior seta; scutellum almost as long as wide. Wing: costal vein ratio 0.15–0.18; M vein ratio 0.38–0.45; crossvein r-m slightly but consistently basad of middle of discal cell. Femora and tibiae gray, concolorous with pleural region; tarsi yellow.

Abdomen: Male terminalia (Figs. 1–2): Surstylus in lateral view (Fig. 1) as high as epandrium, wider medially, tapered thereafter to broadly rounded ventral apex; in posterior view (Fig. 2) surstylus tapered very slightly toward venter until apical ¼ where medial margin tapered more abruptly, making apex narrow and parallel sided.

Type Material.—The holotype ♂ is labeled "NEW ZEALAND. S[OUTH] ISL[AND]. NN: Cable Bay (41°09.6′S, 173°24.9′E), 13 Feb 1998 [,] Wayne N. Mathis." The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in NZAC. Twenty-seven paratypes (24 ♂, 3 ♀; NZAC, USNM) bear the same label data as

the holotype. Other paratypes are as follows: NEW ZEALAND. North Island: AK: Auckland Centennial Park (37°0.7′S, 174°36.3′E), 18 Feb 1998, W. N. Mathis (3 ♂, 4 ♀; USNM); Taramaire Beach (37°09.1′S, 175°18.5′E), 8 Feb 1998, W. N. Mathis (1 ♂; USNM). ND: Whananaki South (beach; 35°31.1′S, 174°27.2′E), 19 Feb 1998, W. N. Mathis (19 ♂, 10 ♀; NZAC, USNM)

Distribution.—Australasian: New Zealand (AK, NC, NN).

Etymology.—The species epithet is a genitive patronym to recognize the generous assistance of Dr. Trevor K. Crosby (NZAC) to my research on the shore and beach flies of New Zealand.

Remarks.—There is considerable variability in the color of the dorsal surface, especially the mesonotum. In the series from the type locality, the coloration is mostly bluish gray to gray with just faint tannish to brownish areas medially. But in the long series from Whananaki South there is notably more brownish coloration dorsally. The mesofrons, however, remains mostly silvery to bluish gray in specimens from all localities.

Isocanace albiceps (Malloch) (Figs. 3–12)

Canace albiceps Malloch 1925: 87 [HT ♀ (AM); Australia. New South Wales: Sydney].—Wirth 1951: 262 [review].

Isocanace albiceps: Mathis 1982: 18 [generic combination]; 1989a: 670 [Australasian/Oceanian catalog]; 1992: 6 [world catalog]; 1996: 338–339 [Australian fauna].—Colless and McAlpine 1991: 779 [fig. of head].

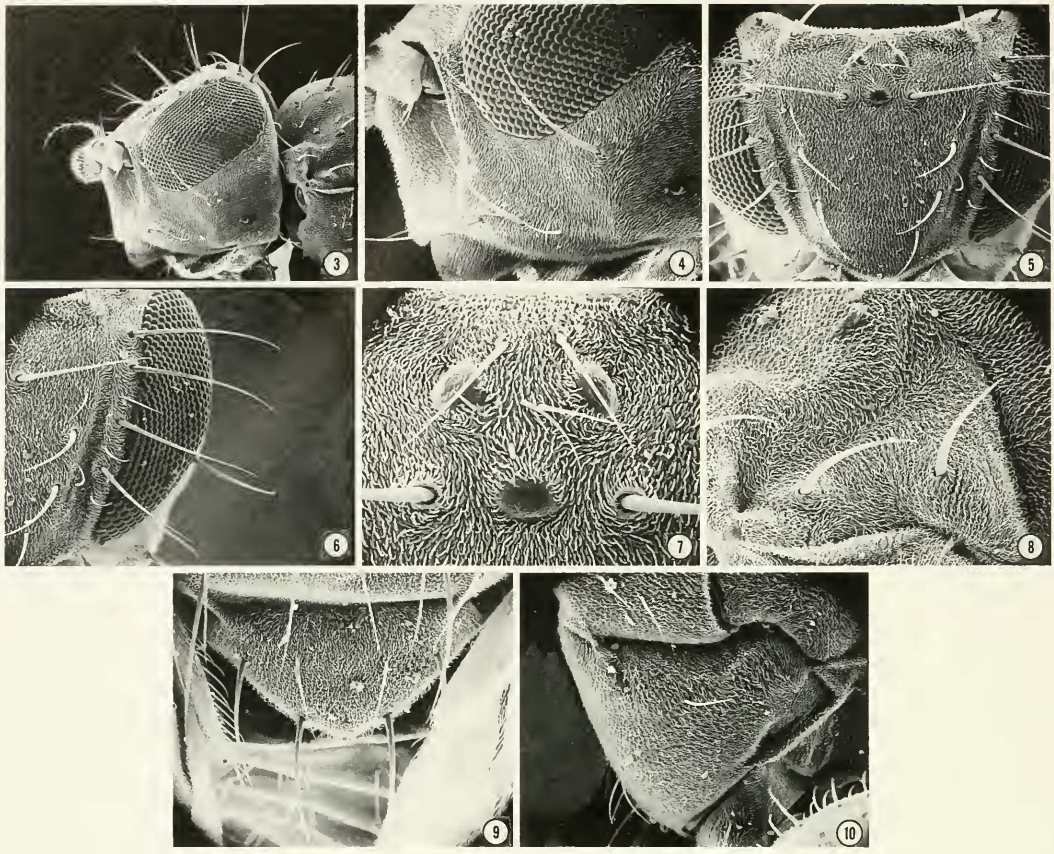
Diagnosis.—Specimens of *I. albiceps* are similar to those of the *Isocanace briani* group and *I. crosbyi* but are distinguished by: mesofrons bare in middle (Fig. 5); postocellar seta short and with more proclinate orientation (Fig. 7); lateroclinate fronto-orbital setae 4; arista with branching rays long, some nearly double basal aristal width (Fig. 3); dorsally curved genal setae 2 (Fig. 4); acrostichal setulae in 2 rows; anterior notopleural seta subequal in length to posterior seta (Fig. 8); anepisternal setae pale; katepisternum lacking a large seta (Fig. 10); crossvein r-m at about middle of discal cell; surstylus (Figs. 11–12) relatively wide in lateral view, narrowed subapically, but slightly widened again apically and slightly bulbous, with slight median projected process; posterior margin of surstylus sinuous, anterior margin straight.

Specimens examined.—AUSTRALIA. New South Wales: Broulee, 17 Sep 1978, Z. Liepa (2 ♂, 3 ♀; ANIC). Careel Bay, 22 Mar–23 Oct 1956, 1962, D. K. McAlpine, W. W. Wirth (35 ♂, 56 ♀; AM, ANIC, USNM). Cornulla (34°2.1′S, 151°9.1′E), 22 Feb 1998, W. N. Mathis (1 ♂, 2 ♀; USNM). Karuah (inlet, beach), 23 Dec 1968, I. C. Yeo (4 ♂, 9 ♀; UQIC). McCarrs Creek, 20 Sep 1956, W. W. Wirth (2 ♂; USNM). Merimbula (mangrove flat), 12 Feb 1963, D. K. McAlpine (1 ♀; AM). Mona Vale, 11 Nov 1956, W. W. Wirth (1 ♂; USNM). North Cronulla (mangroves), 29 Jan–22 Mar 1962, D. K. McAlpine (4 ♂, 3 ♀; AM). Putty Beach (near Terrigal), 25 Nov 1987, R. Blanche, B. Day, D. K. McAlpine (1 ♂; AM). Queensland: Deception Bay, 23 May 1966, Z. Liepa (1 ♂; ANIC). Tasmania. Squeaking Point, near Port Sorell (stony beach), 24 Nov 1968, I. C. Yeo (1 ♂, 8 ♀; UQIC).

Distribution.—Australasian: Eastern Australia (NSW, QLD, TAS).

Isocanace briani Group

Diagnosis.—Differing from the *Isocanace albiceps* group as follows: *Head:* mesofrons with scattered setulae on middle; lateroclinate fronto-orbital setae 3–4; 3 dorsally curved genal setae. *Thorax:* acrostichal setulae in 4 rows, lateral row sometimes with fewer setulae and somewhat irregular; anterior notopleural seta distinctly smaller than posterior seta or lacking; katepisternal seta present, although



Figs. 3–10. Scanning electron micrographs of *Isocanace albiceps*. 3, Head, lateral view. 4, Gena and setae, lateral view. 5, Frons, dorsal view. 6, Same, left side, dorsal view. 7, Ocellar triangle, dorsal view. 8, Notopleuron and setae, lateral view. 9, Scutellum, dorsal view. 10, Katepisternum and setae, lateral view.

sometimes pale; midfemur yellow, contrasted with gray to tan fore- and hindfemur.

Discussion.—The shape and armature of the surstylus in males of the *Isocanace briani* group differ markedly from the generalized condition found in the *Isocanace albiceps* group. At the species level these features appear to be excellent discriminating characters.

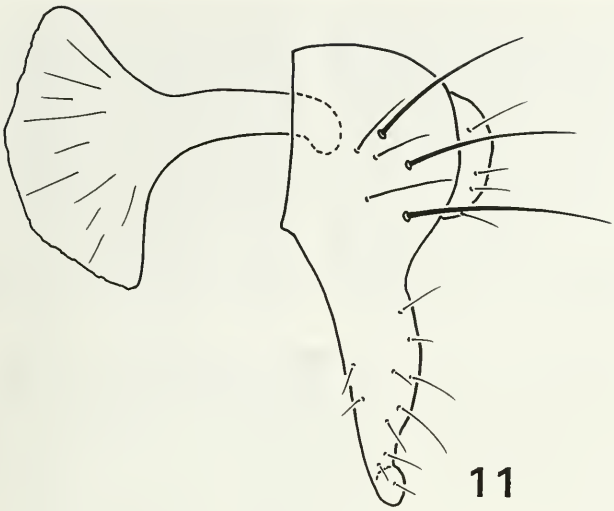
Distribution.—Afrotropical (Aldabra, Kenya, Madagascar, South Africa, Zaire).

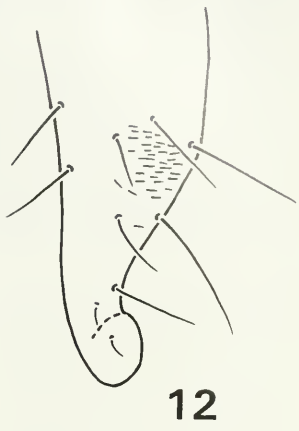
Isocanace australis Mathis
(Figs. 13–14)

Isocanace australis Mathis 1982: 14 [HT ♂ (NMP); South Africa. Cape: Port St. Johns; figure of head and ♂ terminalia]; 1992: 6 [world catalog].

Diagnosis.—This species is distinguished from congeners by the following combination of characters: mesofrons with scattered setulae on middle; lateroclinate fronto-orbital setae 4 (Fig. 13); arista with branching rays shorter, at most slightly longer than aristal width at base; 3 dorsally curved genal setae; anterior notopleural seta distinctly smaller than posterior seta or lacking; anepisternal and katepisternal seta present, black; male terminalia as in Fig. 14.

Specimens examined.—KENYA. Mombasa (100 km N), 4 Dec 1989, A. Freidberg, F. Kaplan (19 ♂, 15 ♀; USNM). Ngomeni (150 km N Mombasa), 4 Dec 1989, A. Freidberg, F. Kaplan (2 ♀; USNM). Takaungu (50 km N Mombasa), 3 Dec 1989, A. Freidberg, F. Kaplan (2 ♀; USNM).





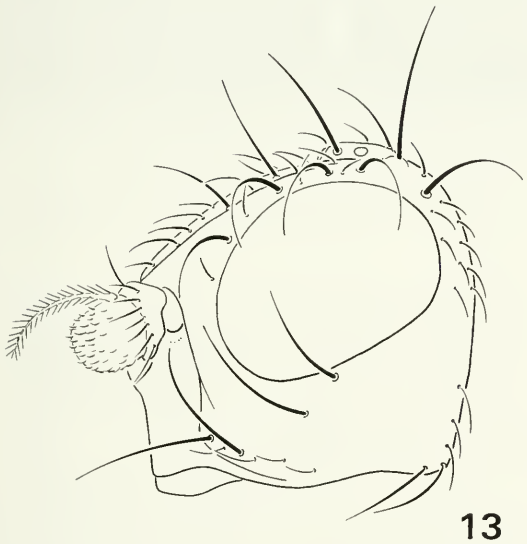
Figs. 11–12. External male terminalia of *Isocanace albiceps*. 11, Epandrium, cercus, and surstylus, lateral view. 12, Surstylus, lateral view.

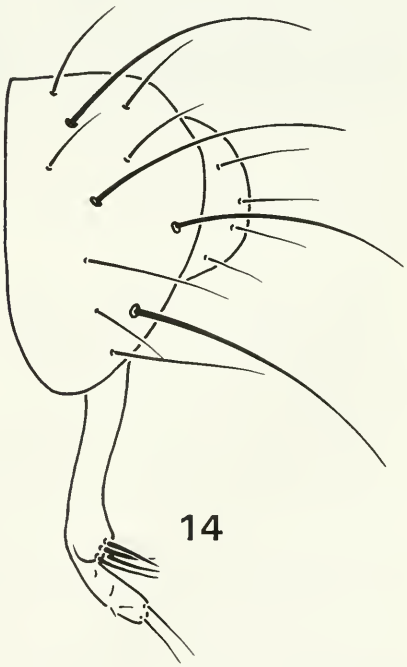
SOUTH AFRICA. Cape Province: Port St. Johns, B. and P. Stuckenberg (2 ♂, 2 ♀; paratypes; USNM).

Distribution.—Afrotropical: Kenya, South Africa (Cape).

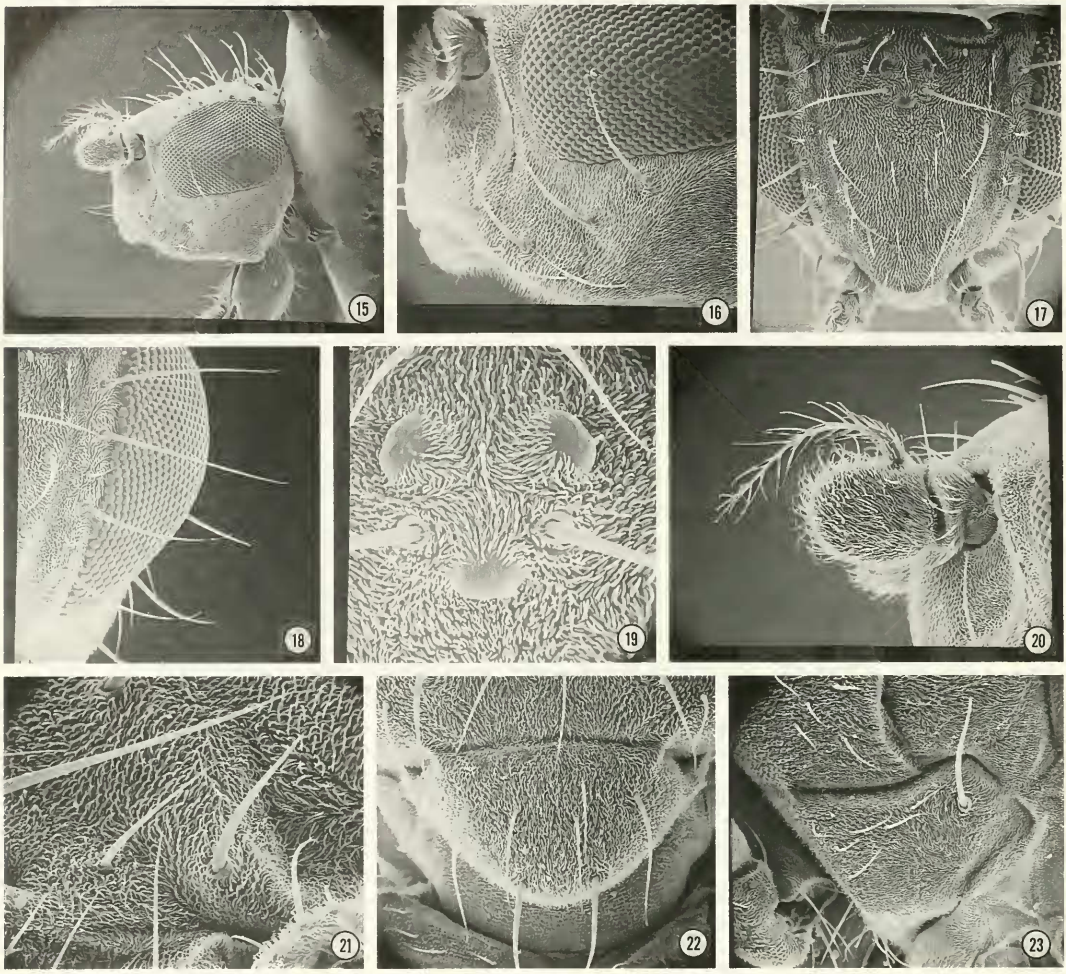
Isocanace briani Mathis
(Figs. 15–25)

Canace stuckenbergi Mathis and Wirth 1979: 786 [HT ♂ (MNHN); Madagascar.





Figs. 13–14. *Isocanace australis*. 13, Head, lateral view. 14, Epandrium, cercus, and surstylus, lateral view.



Figs. 15–23. Scanning electron micrographs of *Isocanace briani*. 15, Head, lateral view. 16, Gena and setae, lateral view. 17, Frons, dorsal view. 18, Same, left side, dorsal view. 19, Ocellar triangle, dorsal view. 20, Antenna, lateral view. 21, Notopleuron and setae, lateral view. 22, Scutellum, dorsal view. 23, Katepisternum and setae, lateral view.

Antseranana: Sambirano Lokobe Nosy Bé figure of ♂ terminalia; junior primary homonym, see Wirth 1956: 50].

Isocanace briani Mathis 1982: 15 [new name for *C. stuckenbergi* Mathis and Wirth 1979; figures of head, thorax, and ♂ terminalia]; 1992: 6 [world catalog].

Diagnosis.—This species is distinguished from congeners by the following combination of characters: mesofrons with scattered setulae on middle; lateroclinate fronto-orbital setae 4; 3 dorsally curved genal setae; arista with branching rays long, some nearly double aristal width at base; anterior notopleural seta distinctly smaller than posterior seta or lacking; anepisternal seta pale, mostly yellowish; katepisternal seta present, pale, mostly yellowish.

Specimens examined.—ALDABRA. Grande Terre: Anse Mais, 17 Mar 1986, W. N. Mathis (1 ♂; USNM); Cinq Cases (on mud around saline pools), 23–29 Jan 1968, B. Cogan, A. Hutson (1 ♀; USNM); Point Hodoul (tidal saline pool), 27 Jan 1968, B. Cogan, A. Hutson (1 ♂, 2 ♀; USNM). Malabar: East Channel (near), 18–23 Feb 1968,

Figs. 24–25. External male terminalia of *Isocanace briani*. 24, Epandrium, cercus, and surstylus, lateral view (type locality). 25, Same (Aldabra), lateral view.

B. Cogan, A. Hutson (1 ♂, 1 ♀; USNM). Picard: Bassin Labine (trail to), 20 Mar 1986, W. N. Mathis (12 ♂, 7 ♀; USNM); La Gigi, 19–24 Mar 1986, W. N. Mathis (7 ♂, 20 ♀; USNM); Settlement, 15–21 Mar 1986, W. N. Mathis (3 ♂, 1 ♀; USNM). MADAGASCAR. Antsiranana: Nosy Be, Ambatoloaka (beach), 4–7 Apr 1991, A. Freidberg, F. Kaplan (15 ♂, 25 ♀; USNM). Nosy Be, Andoany (Hell-Ville), 5 Apr 1991, A. Freidberg, F. Kaplan (4 ♂, 2 ♀; USNM). Nosy Be, Sambirano, Lokobe (6 m; rocks on beach), 9–23 Nov 1957, B. Stuckenberg (4 ♂, 13 ♀; USNM). Ramena, 10 Apr 1991, A. Freidberg, F. Kaplan (2 ♂, 18 ♀; USNM). Nosy Domba, 6 Apr 1991, A Freidberg, F. Kaplan (1 ♀; USNM).

Distribution.—Afrotropical: Madagascar (Antsiranana), Seychelles (Aldabra).

Isocanace flava (Canzoneri and Meneghini)
(Figs. 26–29)

Canace flava Canzoneri and Meneghini 1969: 184 [HT ♂ (MRAC); Zaire. Albert National Park: May ya Moto].—Cogan 1980: 694 [Afrotropical catalog].

Isocanace flava: Mathis 1982: 17 [generic combination; figures of head, thorax, ♂ terminalia]; 1992: 6 [world catalog].

Diagnosis.—This species is distinguished from congeners by the following combination of characters: mesofrons with scattered setulae on middle (Fig. 26); lateroclinate fronto-orbital setae 4 (Figs. 26–27); arista with branching rays shorter, at most slightly longer than aristal width at base (Fig. 27); 3 dorsally curved genal setae (Fig. 27); anterior notopleural seta distinctly smaller than posterior seta or lacking; anepisternal and katepisternal seta present, black; male terminalia as in Fig. 29.

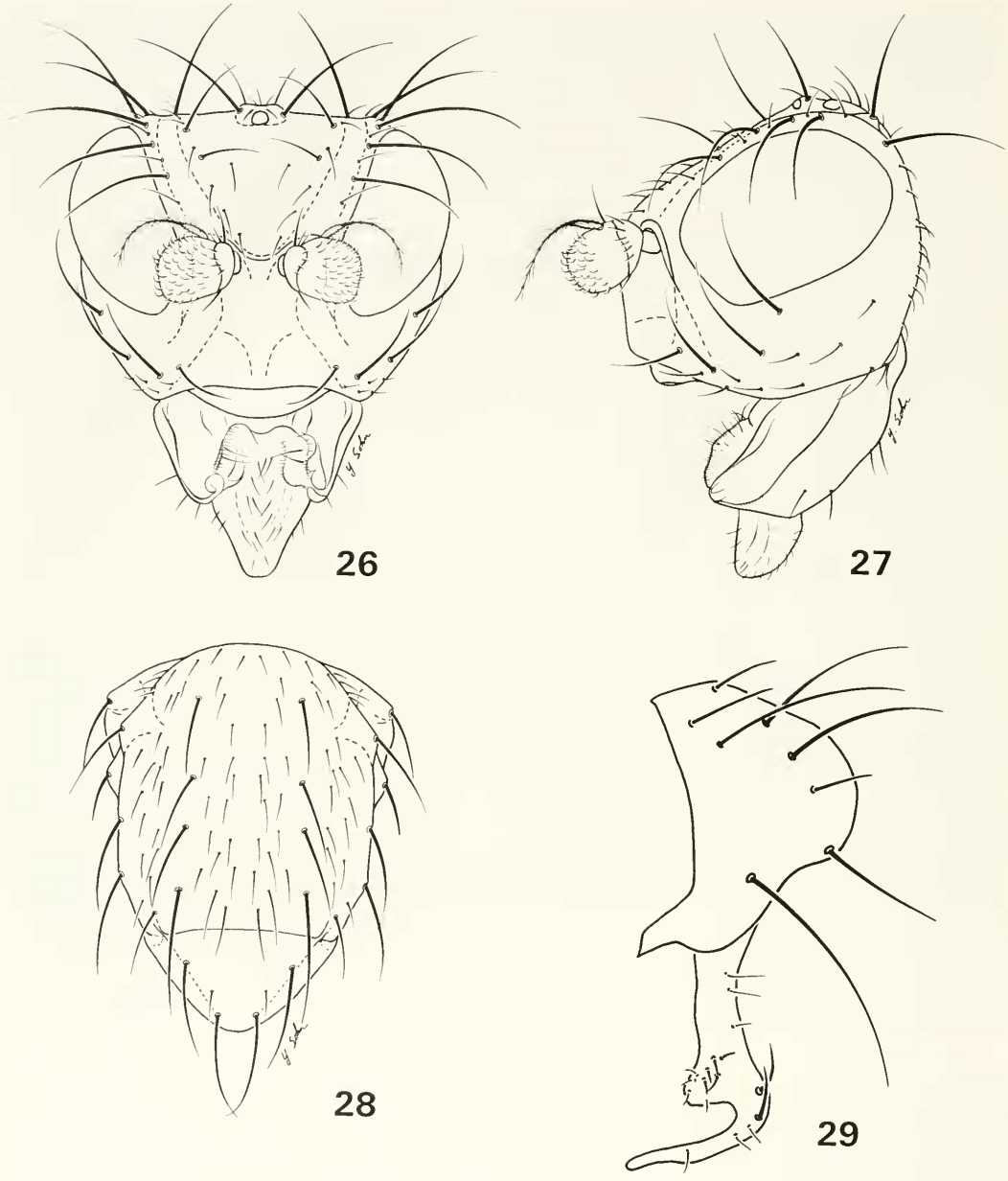
Distribution.—Afrotropical: Zaire (Haut-Zaire).

***Isocanace freidbergi* Mathis, new species**
(Figs. 30–31)

Description.—This species is similar to *I. flava* but is distinguished from it and other congeners by the following combination of characters: small to moderately-small beach flies, length 1.65–2.40 mm; mostly gray.

Head: Mesofrons whitish gray to tannish gray, bearing scattered setulae on middle and 2–3 large, lateral proclinate setae; lateroclinate fronto-orbital setae 3. Antenna mostly yellow but with varying amounts of blackish overlay, especially on flagellomere 1; arista bearing short branching hairs, these at most slightly longer than aristal width at base. Large, dorsally curved genal setae 3, 1 large anteroclinate seta, and 3–5 much smaller, anteroclinate setulae.

Thorax: Acrostichal setulae in 4 somewhat irregular rows of numerous setulae and with a larger, prescutellar pair; anterior notopleural seta either lacking or pale and much smaller than posterior seta; anepisternal and

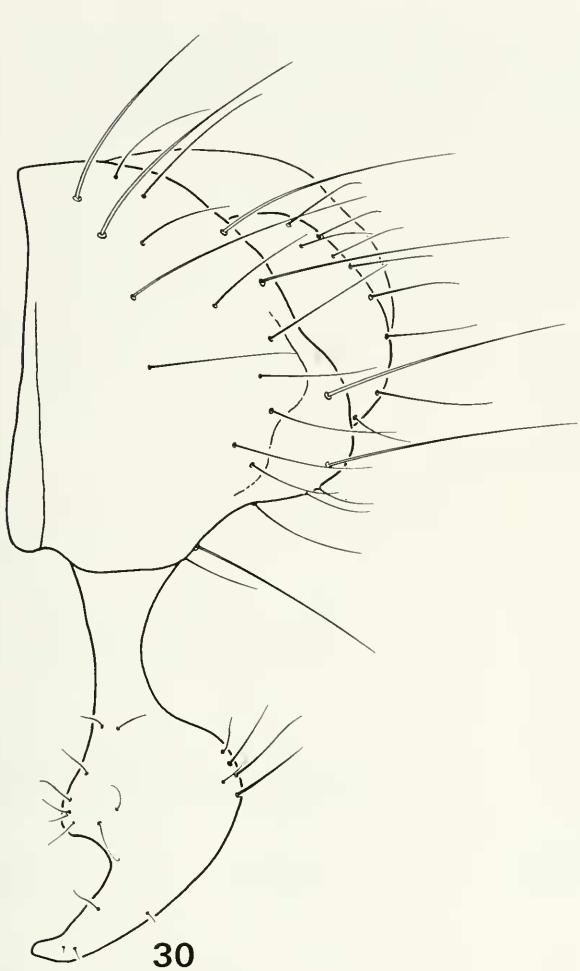


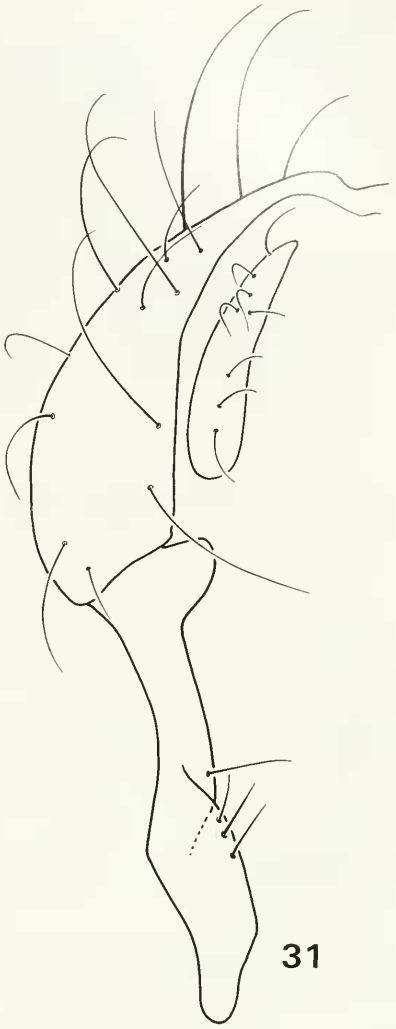
Figs. 26–29. *Isocanace flava.* 26, Head, anterior view. 27. Same, lateral view. 28, Thorax, dorsal view. 29, Epandrium and surstylus, lateral view.

katepisternal seta present, black. Wing with costal vein ratio 0.21; M vein ratio 0.36–0.47. Femora of mid and hindlegs mostly microtomentose, gray, concolorous with pleural region, midfemora more yellowish but with some faint investment of gray microtomentum; tibiae and tarsi yellow.

Abdomen: Male terminalia (Figs. 30–31): Surstylus in lateral view irregularly hooklike to sickle shaped (Fig. 30), widest at basal ⅓, apex pointed, curved anteriorly; in posterior view as in Fig. 31.

Type Material.—The holotype ♂ is labeled "KENYA Takaungu, 50 km North





Figs. 30–31. External male terminalia of *Isocanace freidbergi*. 30, Epandrium, cercus, and surstylus, lateral view. 31, Same, posterior view.

Mombasa 3. XII. 1989 A. FREIDBERG & FINI KAPLAN." The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Thirty-nine paratypes (14 ♂, 25 ♀; TAU, USNM) bear the same label data as the holotype. Other paratypes are as follows: *KENYA*. Gazi (60 km S Mombasa; route A14), 5 May 1991, A. Freidberg, F. Kaplan (3 ♂, 3 ♀; TAU, USNM).

Distribution.—Afrotropical: Kenya.

Etymology.—The species epithet is a genitive patronym to recognize the importance of the collecting efforts of Dr. Amnon Freidberg (TAU) to my research on the shore and beach flies of Africa.

Remarks.—This species is apparently the sister species of *I. flava*, with supporting evidence being the hook to sicklelike apex of the surstylus in lateral view (Figs. 29, 31). Unlike its sister species, which is found in freshwater habitats in the Rift Valley (eastern Zaire), this species occurs in coastal habitats that are saline.

Acknowledgments

I am grateful for the assistance and cooperation of many organizations and individuals who contributed to the field work and production of this paper. To Dr. Trevor K. Crosby (NZAC) and Drs. Daniel J. Bickel and David K. McAlpine (AM) and their institutions, who expedited the arrangements for field work and loaned specimens, I express my sincere thanks.

The line illustrations were either entirely produced (Figs. 26–28) or carefully inked by Mr. Young T. Sohn. For reviewing a draft of this paper I thank Drs. Amnon Freidberg, Volker Hollmann-Schirrmacher, Allen L. Norrbom, and Norman E. Woodley.

I am also grateful to Dr. Anna K. Bernensmeyer, former Associate Director for Science, National Museum of Natural History, Smithsonian Institution, for financial support to conduct research at the Natural History Museum (BMNH), London, England, through grants from the Research Opportunity Fund. Field work on New Zealand was facilitated through a grant from Mr. Helmut Hollmann, benefactor for research on shore flies. I gratefully acknowledge his generous assistance. Travel to and from New Zealand was largely provided by British Airways, and I am grateful to them for generously supporting this research, especially the field work on New Zealand. Field work on New Zealand was greatly expedited through the pleasant assistance of Dr. Volker Hollmann-Schirrmacher.

Literature Cited

Canzoneri, S. and D. Meneghini. 1969. Sugli Ephydridae e Canaceidae della fauna etiopica. Bollettino del Museo Civico di Storia Naturale di Venezia 19: 101–185.

Cogan, B. H. 1980. 79, Family Canacidae, p. 694. *In* Crosskey, R. W., ed., Catalog of the Diptera of the Afrotropical Region. London: British Museum (Natural History), 1437 pp.

Colless, D. H. and D. K. McAlpine. 1991. 39. Diptera (Flies), pp. 717–786. *In* Naumann, I. D., ed., Insects of Australia. A Textbook for Students and Research Workers. 2nd ed., Vol. 2. Melbourne University Press, Carlton, Victoria, 1137 pp.

Crosby, T. K., J. S. Dugdale, and J. C. Watt. 1976. Recording specimens localities in New Zealand: an arbitrary system of areas and codes defined. New Zealand Journal of Zoology 3: 69.

Harrison, R. A. 1959. Acalypterate Diptera of New Zealand. New Zealand Department of Scientific and Industrial Research Bulletin 128, 382 pp.

Malloch, J. R. 1925. Notes on Australian Diptera, No. vi. Proceedings of the Linnean Society of New South Wales 50(2): 80–97.

Mathis, W. N. 1982. Studies of Canacidae (Diptera), I: Suprageneric revision of the family, with revisions of new tribe Dynomiellini and new genus *Isocanace*. Smithsonian Contributions to Zoology 347: iii + 1–29.

———. 1988. First record of the genus *Procanace* Hendel from North America, with the description of a new species (Diptera: Canacidae). Proceedings of the Entomological Society of Washington 90(3): 329–333.

———. 1989. 103. Family Canacidae, pp. 669–670. *In* Evenhuis, N. L., ed., Catalog of the Diptera of the Australasian and Oceanian Regions. E. J. Brill and B. P. Bishop Museum special publication 86, 1155 pp.

———. 1992. World catalog of the beach-fly family Canacidae (Diptera). Smithsonian Contributions to Zoology 536: 1–18.

———. 1996. Australian beach flies (Diptera: Canacidae). Proceedings of the Biological Society of Washington 109(2): 326–348.

Mathis, W. N. and L. Munari. 1996. A catalog of the Tethinidae (Diptera). Smithsonian Contributions to Zoology 584: 1–27.

Mathis, W. N. and W. W. Wirth. 1979. Beach flies of Madagascar (Diptera: Canacidae). Annals of the Natal Museum 23(3): 785–796.

Wirth, W. W. 1951. A revision of the dipterous family Canaceidae. Occasional Papers of Bernice P. Bishop Museum 20(14): 245–275.

———. 1956. New species and records of South African Canaceidae (Diptera). Journal of the Entomological Society of South Africa 19(1): 47–51.

———. 1987. 102. Canacidae, pp. 1079–1083. *In* McAlpine, J. F., ed., Manual of Nearctic Diptera, Vol. 2. Research Branch, Agriculture Canada, Monograph 28. Ottawa, iv + 675–1332 pp.